

WHAT IS CLAIMED IS:

1. An isolated polypeptide, which associates with TrkA and p75 neurotrophin receptors, is a target for phosphorylation by neurotrophin and ephrin receptor tyrosine kinases, enhances neurotransmitter release, and modulates the clustering of proteins involved in ion channel formation, comprising the amino acid sequence of:

(A) SEQ ID NO:2;

(B) SEQ ID NO:4;

(C) a fragment of the polypeptide of SEQ ID NO:2;

(D) a fragment of the polypeptide of SEQ ID NO:4;

(E) a variant polypeptide which is at least 95%

identical to SEQ ID NO:2;

(F) a variant polypeptide which is at least 95% identical to SEQ ID NO:4; or

(G) a functional derivative or a salt of (A), (B), (C), (D), (E), or (F)

wherein said fragments (C) and (D) and said variants (E) and (F) have the properties of associating with TrkA and p75 neurotrophin receptors, being a target for phosphorylation by neurotrophin and ephrin receptor tyrosine kinase, enhancing neurotransmitter release, and modulating the clustering of proteins involved in ion channel formation.

2. The polypeptide of claim 1, which comprises the amino acid sequence of SEQ ID NO:2.

3. The polypeptide of claim 1, which comprises the amino acid sequence of SEQ ID NO:4.

5 4. The polypeptide of claim 1, which comprises the amino acid sequence of fragment (C).

5. The polypeptide of claim 4, wherein said fragment (C) either further contains one or more transmembrane domains of the polypeptide of SEQ ID NO:2 or is fused to a  
10 transmembrane domain to form a fusion polypeptide.

6. The polypeptide of claim 1, which comprises the amino acid sequence of fragment (D).

7. The polypeptide of claim 6, wherein said fragment (D) either further contains one or more transmembrane  
15 domain of the polypeptide of SEQ ID NO:4 or is fused to a transmembrane domain to form a fusion polypeptide.

8. The polypeptide of claim 1, which comprises the amino acid sequence of a variant polypeptide which is at least 95% identical to SEQ ID NO:2.

20 9. The polypeptide of claim 1, which comprises the amino acid sequence of a variant polypeptide which is at least 95% identical to SEQ ID NO:4.

25 10. A molecule which contains the antigen-binding portion of an antibody specific for the polypeptide of claim 1.

11. The molecule of claim 10, which is a monoclonal antibody.

12. The molecule of claim 10, which is a single chain antibody.

5 13. The molecule of claim 10, which is specific for a polypeptide of SEQ ID NO:2.

14. A method for visualizing the growth cone of neurons, comprising:

10 contacting the molecule of claim 13 with neurons to detect the presence of the polypeptide of SEQ ID NO:2 as a marker for the growth cone of neurons; and

visualizing the growth cone of neurons by the binding of the molecule of claim 13 to the polypeptide of SEQ  
15 ID NO:2 localized in the growth cone of neurons.

15. The molecule of claim 10, which is specific for a polypeptide of SEQ ID NO:4.

16. A method for visualizing the growth cone of neurons, comprising:

20 contacting the molecule of claim 15 with neurons to detect the presence of the polypeptide of SEQ ID NO:4 as a marker for the growth cone of neurons; and

visualizing the growth cone of neurons by the binding of the molecule of claim 15 to the polypeptide of SEQ  
25 ID NO:4 localized in the growth cone of neurons.

17. An isolated nucleic acid encoding the polypeptide of claim 1.

18. The nucleic acid of claim 17, which encodes a polypeptide comprising SEQ ID NO:2.

5 19. The nucleic acid of claim 18, comprising a nucleotide sequence of SEQ ID NO:1.

20. The nucleic acid of claim 17, which encodes a polypeptide comprising SEQ ID NO:4.

10 21. The nucleic acid of claim 20, comprising a nucleotide sequence of SEQ ID NO:3.

22. The nucleic acid of claim 17, which encodes the amino acid sequence of fragment (C).

15 23. The nucleic acid of claim 17, which encodes the amino acid sequence of fragment (D).

24. The nucleic acid of claim 17, which encodes a variant polypeptide which is at least 95% identical to SEQ ID NO:2.

25. The nucleic acid of claim 17, which encodes a variant polypeptide which is at least 95% identical to SEQ ID NO:4.

25 26. A vector comprising the nucleic acid of claim 17.

27. A host cell transformed with the nucleic acid of claim 17.

28. A method for producing a polypeptide which associates with TrkA and p75 neurotrophin receptors, is a

target for phosphorylation by neurotrophin and ephrin receptor tyrosine kinases, enhances neurotransmitter release, and modulates the clustering of proteins involved in ion channel formation, comprising:

5                   culturing the host cell of claim 27 in a nutrient medium to express and produce the polypeptide; and  
                  recovering the produced polypeptide.

29. An isolated nucleic acid, which specifically hybridizes under stringent conditions to the complement of  
10 either SEQ ID NO:1 or SEQ ID NO:3.

30. The nucleic acid of claim 29, which specifically hybridizes under highly stringent conditions to the complement of SEQ ID NO:1.

31. The nucleic acid of claim 29, which  
15 specifically hybridizes under hybridizes under highly stringent conditions to the complement of SEQ ID NO:3.

32. A vector comprising the nucleic acid of claim 29.

20                   33. A host cell transformed with the nucleic acid of claim 29.

34. A method for producing a polypeptide which associates with TrkA and p75 neurotrophin receptors, is a target for phosphorylation by neurotrophin and ephrin receptor  
25 tyrosine kinases enhances neurotransmitter release, and

modulates the clustering of proteins involved in ion channel formation, comprising:

culturing the host cell of claim 33 in a nutrient medium to express and produce the polypeptide; and

5 recovering the produced polypeptide.